

PLUM TREE NAMED 'C5'

BACKGROUND OF THE NEW VARIETY

The present invention relates to a new and distinct variety of plum tree (*Prunus domestica* L.) which is named 'C5', in particular to a plum tree having the plum pox virus (PPV) coat protein gene which imparts a high level of resistance to infection by PPV.

The new variety is especially attractive commercially due to its PPV resistance. Plum pox virus is the most serious virus disease of plum and other *Prunus* species and has spread throughout Europe and England and has been reported in India, Egypt and Chile. More recently, outbreaks of the disease have been reported in the eastern United States and Canada. Plum pox virus causes serious fruit loss and can cause tree death. In the Czech Republic alone, the number of plum trees has dropped from a high of 18 million to less than 5 million due to the presence of PPV in the orchards. Thus a tree having resistance to infection by the virus would be a highly desirable commercial product in the U.S.

The new variety was originated *in vitro* by *Agrobacterium tumefaciens*-mediated transformation of the 'Bluebyrd' (not

patented) plum with the PPV coat protein gene at the Appalachian Fruit Research Station, Agricultural Research Service, U.S. Department of Agriculture in Kearneysville, WV. Transformation of hypocotyl slices from a seed of 'Bluebyrd' was carried out, and transgenic plants containing the PPV coat protein gene were successfully generated from the hypocotyl slices. In addition to the PPV coat protein gene, the plants also contained genes for kanamycin resistance (NPTII) and β -glucuronidase (GUS), transformation selection markers. The transformation and regeneration process is described in detail in Scorza et al. (1994. *Plant Cell Reports*. vol. 14, pp. 18-22).

The new variety was selected from a group of 21 clones derived from the transformation of hypocotyl slices from open pollinated seed of the 'Bluebyrd' plum. The new variety was distinct from the remaining transgenic clones containing the PPV coat protein, NPTII and GUS genes due to the presence of multiple copies of the PPV coat protein transgene, the low amount of PPV coat protein RNA produced and the absence of detectable PPV coat protein (Scorza et al., *supra*). Resistance is mediated through post transcriptional gene silencing (as described in Scorza et al. 2001. *Transgenic Research*. vol. 10, pp. 201-209).

While the female (seed) parent of 'C5' is 'Bluebyrd', the pollen source (male parent) is unknown. The new variety is distinct from its seed parent by its fruit quality, earlier ripening date (about 1 week earlier) and by the presence of the PPV coat protein, NPTII and GUS transgenes and by its high level of resistance to PPV. Since, at the time of the invention, no other plum tree contained these genes either singly or jointly, the pollen parent could not have contributed any of them, thus the new variety is also distinct from its pollen parent. Plum pox virus resistance is described in Ravelonandro et al. (1997. *Plant Disease*. vol. 81, pp. 1231-1235).

The new variety was originally selected *in vitro* as a regenerated shoot from a 'Bluebyrd' plum seed hypocotyl slice that had been transfected with *Agrobacterium tumefaciens* EHA 101 carrying the plasmid pGA482GG/PPV-CP-33. The regenerated transformed shoot was rooted *in vitro* and transferred to the greenhouse for continued growth. After two years in the greenhouse, the original greenhouse-grown plant was field planted and maintained under close observation.

The new variety is vegetatively propagated (originally from the greenhouse-grown plant) by bud-grafting on to standard

rootstocks, including but not limited to *Prunus persica* (GF305 peach), *Prunus domestica* (European plum seedlings), *Prunus myrobalan* and [*Prunus cerasifera* x *P. munsoniana*] (GF 8-1).

Comparisons of vegetatively propagated trees and the original

5 plant of the new variety have shown that the characteristics of high level of PPV resistance, vigorous growth, upright tree form, productivity, high fruit quality and large fruit size are maintained. No aberrant types appeared.

The new variety serves as an effective parent for
10 transferring the PPV coat protein gene and resistance to PPV (as described in Scorza et al. 1998. *Acta Hort.* vol. 472, pp. 421-427 and Ravelonandro et al. 1998. *Acta Hort.* vol. 478, pp. 67-71).

The transgene insert is transferred as a single genetic locus and resistance acts in a dominant manner. This simply inherited
15 dominant resistance provides resistance as described above to the major known serotypes of PPV (Ravelonandro et al. 2001. *Acta Hort.* vol. 550, pp. 431-435).

Transformation of plum has been described in the literature, however trees having the characteristics as described herein have
20 not been produced. Researchers have been unable to achieve the same combination of fruit quality, resistance to PPV,

productivity and tree growth that makes the new variety commercially attractive for fruit production.

SUMMARY OF THE NEW VARIETY

5 The new and distinct variety of plum tree is large, productive, vigorous with an upright growth habit. The fruit is medium to large in size, is freestone with slight cling and is of excellent eating quality. The fruit has yellow flesh of firm texture and sweet flavor and blue skin. The new variety is distinguished from all other plum trees by resistance to plum pox virus infection due to the presence of the plum pox virus coat protein gene.

BRIEF DESCRIPTION OF THE DRAWINGS

15 Figure 1 is a color photograph showing fruit and leaves of the new plum variety 'C5' at maturity.

Figure 2 is a color photograph of the tree of the new plum variety 'C5'.

20 DETAILED DESCRIPTION OF THE NEW VARIETY

The following is a detailed description of the botanical and

5 pomological characteristics of the subject plum. Color data are presented in Royal Horticultural Society (RHS) Color Chart designations. Where dimensions, sizes, color, and other characteristics are given, it is to be understood that such characteristics are approximations of averages set forth as accurately as practicable.

The descriptions reported herein are from specimens grown at Kearneysville, West Virginia.

10 *Tree:*

Size. - Large.

Vigor. - Vigorous.

Growth. - Upright.

Density. - Medium dense to dense.

15 Productivity. - Productive.

Bearing. - Regular.

Trunk:

Size. - Moderate to large.

Color. - Grayed-green RHS 197A-D.

20 *Branches:*

Size. - Medium.

Texture. - Smooth to medium rough.

Spur development. - Moderate.

Color. - Grayed-green RHS 197A-D.

Shoots from roots (rootsuckers). - moderate to heavy.

5 *Leaves:*

Size. - Average length 92 mm, average width 45 mm.

Texture. - Smooth to somewhat rough.

Thickness. - Medium to thick.

Glands. - Two, small, round.

10 Margin. - Dentate.

Form. - Obovate-pointed.

Petiole. - Medium length, medium thickness.

Color. - Upper surface-green RHS 139A; lower surface-green
RHS 137B-C.

15 *Flowers:*

Bloom period. - Variable depending on weather, late March to
mid-April in the Eastern Panhandle of West Virginia.

Color. - White.

Pollen. - Present.

Fruit:

Maturity when described. - Firm, ripe; harvested on August 16, 2001.

Average date of harvest. - Mid August to early September.

5 Size. - Medium to large; average size is 43 mm transverse diameter at right angles to the suture plane x 45 mm transverse diameter in the suture plane x 52 mm axial diameter; average weight is 60 grams.

Flesh:

10 Ripens. - Evenly.

Texture. - Firm.

Fibers. - Small, few, tender.

Juice. - Moderate at eating-ripe.

Aroma. - Moderate.

15 Flavor. - Very good.

Eating quality. - Sweet, excellent; brix of ripe fruit averages 21.5° depending on maturity at harvest.

Color. - Yellow RHS 6A-C.

Skin:

20 Thickness. - Medium.

Tendency to crack. - None.

Color. - Blue, with wax bloom RHS 91B, with wax bloom
removed RHS 103A.

Stone:

Type. - Freestone, slight cling.

5 Size. - Medium; average length 27 mm, average width 17 mm,
average thickness 10 mm.

Form. - Ovate/asymmetrical.

Tendency to split. - None.

Color. - Grayed-orange RHS 165C.

10 Use: Market - local and long distance for fresh markets. The
plum tree and its fruit described herein may vary slightly
in detail due to climate, soil conditions and cultural
practices under which the variety may be grown.

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